

# **Iridium Phone Use Assessment BLM Alaska 1999 Field Use**

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## I. Overview and executive summary

BLM in Alaska operates over a vast area. We spend in the neighborhood of \$250,000 each year maintaining a backbone system of mountaintop VHF radios, which provides solid coverage to less than 50% of that area. Given mandates for flight following, and field personnel safety, more extensive communication coverage is urgently needed. Together with the recent mandate to narrow band our radios, and move toward digital systems, we have great incentive to explore more modern alternatives to VHF radio. Following a statewide user telecommunication needs survey in the spring of 1998, we embarked on an exploration of satellite telephony as such an alternative. As of this date, the only system which offers total statewide coverage, independent of local topography, is Iridium.

The Iridium satellite system began commercial service late in 1998. BLM Alaska was a Beta Test Site and had two phones with unlimited free air time for the months of December 1998 and January 1999. The results of that testing convinced us that this is an important communication tool for our operations across the state of Alaska. We began to procure phones to conduct a more extensive operational trial for the field season of 1999. By the time we were heavily into the field and fire season, there were over 50 phones statewide. As of this writing there are at least 71 phones spread around BLM Alaska. This paper reports on the experience gained during 1999.

The quick summary of our findings is that, for the first time, our employees have reliable communications everywhere they go in the state! This does not mean the phones always worked flawlessly, as there are operational limitations to any system. But they were most advantageous in those areas completely without other means of communication. Users knew they could place a call when they needed to. Our conclusion is that Iridium works, provides easy communications from all our areas of operation, and is very cost effective. For safety alone, it should be a mandatory component of any field kit.

As you will see in the presentations below, the phones were adopted eagerly by field workers. The major complaint all summer long was that we did not have enough phones for the demand. The summer "trial" turned into a full operational deployment of satellite telephony.

A considerable number of anecdotes and operational comments are included. Although they make this report quite long, I feel they give a much better picture of the usefulness than would a brief presentation of statistics.

## II. Iridium phones and users

The Iridium phone instrument is known as an Iridium Subscriber Unit (ISU). There are two manufacturers of ISUs, Kyocera and Motorola. More details are available on the individual manufacturers web sites. Motorola units were available long before the Kyocera, so all but a few of our phones are Motorola 9500s. Motorola makes a cell phone cassette to attach to the 9500 and we have two of those for evaluation. Kyocera makes two different models of ISU, a single mode (satellite only) and a dual mode (satellite and cell phone), and we obtained one of each for evaluation. Within the last few months users have begun to procure Kyocera, as well as Motorola, phones. Both vendors offer pagers, and we have twelve of the Motorola pagers. Distribution of the phones around Alaska is shown in Table II-1.

Alaska Fire Service (AFS)			23
	Operational Support	8	
	Warehouse	7	
	Smoke Jumpers	8	
Anchorage Field Office (AFO)			6
	Resources	3	
	Cadastral Survey	3	
Glennallen Field Office (GFO)			9
Northern Field Office (NFO)			23
	Fairbanks Resource	19	
	Tok Resource	2	
	Rangers	2	
Alaska State Office (ASO)			10
	Lands, Minerals, Resources	9	
	Rangers	1	

Table II-1. Distribution of Iridium phones within BLM Alaska

The seven phones placed in the AFS warehouse are available for short period use. We limited this use to around two weeks maximum during the busier time of the season. All of these have been in users'

hands most of the summer. Most of this use was by BLM Alaska personnel, but we did have units out briefly for evaluation by other agencies (e.g. US Customs Alcan). Our units have been used in a variety of Lower 48 states (e.g. Florida, Louisiana, Montana, Nebraska, Utah) and in Mexico and Canada.

Eight of the phones were assigned to the Alaska Smoke Jumpers, and were carried to almost every incident on which they were deployed.

Phones have traveled via aircraft of many types, boats and rafts, four wheelers, snow machines, cars and trucks, parachutes, foot, etc. Users were asked to try to protect them as best they could, but to do their job without letting the phones interfere. We wanted to see how well they would hold up. Each of the 15 phones from the Warehouse and for the Smoke Jumpers were packaged in a small hard plastic case (Pelican Model 1400), along with charger adapters, extra battery and manual. This provided excellent protection during transit. But in daily operation the phones were mostly carried in their leather holster, and subjected to routine field conditions. So far we have had no damage requiring repair, though we have lost a few components such as belt clips and battery covers. Of the 71 phones, three have been sent back for warranty replacement or repair due to marginal operation unrelated to use.

Purchase prices for our Motorola phones have ranged from the original full list price of \$3,395 down to \$1200. Early purchases included only one battery (standard capacity), AC and DC charging adapters and a leather holster. More recent purchases added a second battery (high capacity), antenna adapter and external magnetic mount antenna for automotive use. Recently, these sets have been advertised around \$1,000. Even lower prices may appear, as Motorola has released a new version of the phone which is a bit smaller, lighter, and may have longer battery life. Consequently, vendors are wanting to clear inventory of the older model phones.

Motorola offers a third battery (ultra-high capacity), which occupies the entire accessory compartment, so it can't be used with the cell phone attachment. Since we do not use the cell phone, this has become our battery of choice. All three models are 3.6V Lithium Ion batteries, and very expensive! We have made known our desire for a battery pack which will use standard AA batteries.

Both companies sell solar panels for charging batteries away from AC power. The AFS Radio Shop made up simple assemblies of a solar panel, regulator and small, sealed gel battery. These have worked quite well for those longer term field situations, and are less than half the cost of either vendor's solar panel product.

Our field experience with the Kyocera phones is quite limited. Those who have used them seem to prefer the Kyocera single mode SS-66K over the Motorola 9500, mainly because of the smaller size. We await the newer Motorola offering eagerly.

### III. Iridium System, Service Providers and Service

The operational Iridium System essentially consists of three hierarchical segments: A) the space segment and control for it; B) gateways; C) service providers. More details can be found on the Iridium Web site -- [www.iridium.com](http://www.iridium.com).

#### A. Space Segment

The space segment consists of 66 orbiting satellites, arranged into six orbital planes with eleven satellites in each. The near-polar orbits are equally spaced around the globe and the satellites are equally spaced within each orbital plane. There are six additional satellites orbiting, one per orbital plane, fully functional spares, capable of being moved to replace a failed satellite. Operation and control is done by Iridium LLC, from their headquarters in Virginia. This is an internationally financed corporation, with publicly traded stock, and has been under Chapter 11 reorganization the past few months. Iridium LLC wholesales services only to the gateways.

#### B. Gateways

The gateways are the companies which provide service to major geographical regions. Gateways are the links into the Public Switched Telephone Network (PSTN), as well as providing operational added value to the basic communication service. There are currently several gateways around the world. Iridium North America (INA), in the Phoenix area, is the gateway for US, Canada, Mexico and South American. The gateways wholesale value added services to the service providers.

#### C. Service Providers

The Iridium Web site currently lists about twelve service providers offering service in the US. These are the vendors with whom most users directly interact. They set the pricing and features in service plans. During 1999, we purchased services from four: Bearcom, Earth One, INSAT, Seven Seas. In early summer, US Digital, the parent company of INSAT, decided it did not want to be in the Iridium business, and eliminated INSAT. Their customers were later picked up by Telcam, but by then we had already moved our phones to another provider. We have had excellent service from all providers with whom we have worked. During the startup of the system there were frequent bugs that had to be worked out in billing procedures, etc. All providers have gone to extremes to be sure we were treated fairly and were satisfied with the resulting service and billing.

Because the Iridium system is global, and subscribers can roam anywhere in the world, Iridium has been established as a separate country. Thus, calls between an Iridium ISU and a PSTN phone are always international calls. Iridium determines the pricing only on calls originating from an Iridium phone. Pricing on calls originating from a PSTN are determined by the local carrier under their international

calling plans. Currently in the US, typical prices for ISU to Country Code 1 (CC1, US & Canada) are around \$1.70/min while a call in the other direction (CC1 to ISU) is typically \$6.50/min!

Users typically buy a package of ISU/accessories and service from one of the service providers. However, service is implemented through the use of a removable smart card, called a Subscriber Identity Module (SIM), which can be swapped around different ISUs. Service is determined by the SIM inserted into the ISU. Thus, a specific ISU is not tied to any one provider for service. The pagers, however, do not use SIMs, and have to be physically reprogrammed to be moved to a different service provider.

Early in our use, service plans involved an activation fee (typically \$70-\$100), a monthly fixed fee (typically \$70) and per-minute air time fees (typically \$1.79 - \$2.00/min for ISU to CC1). The air time fees were complicated, depending on where the ISU was located, where the other party was located, and who was calling whom. Because many of our phones would be inactive during the winter months, we were concerned about fixed monthly rates.

In late January, INA invited a group of selected customers (which included the two Beta testers in BLM Alaska) to a User Forum in Phoenix. Iridium provided a number of substantive presentations about the company and operations, and they asked for feedback from the gathered users. There was considerable opportunity for one-on-one conversations with personnel from all levels of all segments of the system. The Alaska contingent continually chanted the mantras of different pricing structures, longer battery life and AA battery packs.

By spring, Iridium had developed, and vendors were offering, an Alaska Plan which required no fixed monthly fees and charged \$1.59-\$1.99/min for calls within Alaska, in exchange for slightly increased activation fees (typically \$100). They also significantly simplified the rate structure for calls outside CC1. Over a couple of months we moved all our phones to the new plan, and the use costs shown below reflect a corresponding reduction in average operational costs. Unfortunately, this plan is no longer available to new service, but some plans still offer no, or lower, fixed monthly fees with slightly higher activation fees and costs per minute.

One service feature not yet described is the Simple Messaging Service (SMS). This allows messages to be sent to the ISU from either a touch tone phone (numeric) or from a messaging section on the Iridium Web site (text). Up to 120 characters can be sent, at no cost to either sender or receiver. This is an extremely useful feature, and was most commonly used to avoid the high costs of calling the ISU from the office. In this regard, it operates similarly to a text pager. However, the ISU does not have to be on when the message is sent. Messages are stored, and will be retrieved the next time the ISU is turned on and registers with the network.

#### IV. Use statistics

The figures presented in the tables below come from billing for air time for the phones. A few missing values make the information approximate, though it probably represents at least 95% of the total.

Table IV-1 and the following discussion address how much the phones were used. Table IV-2 addresses who used them and how they were used.

		Totals		Averages		
	# Active Phones	Minutes	\$\$\$	Min/phone	\$/phone	\$/min
Jan	0	0	\$0			
Feb	6	39	\$1,017	7	\$169	\$26.07
Mar	14	118	\$1,424	8	\$102	\$12.07
Apr	23	580	\$3,691	25	\$160	\$6.36
May	28	881	\$3,899	31	\$139	\$4.43
Jun	33	2,616	\$5,842	79	\$177	\$2.23
Jul	55	8,192	\$17,190	149	\$313	\$2.10
Aug	49	3,373	\$6,032	69	\$123	\$1.79
Sep	30	999	\$1,770	33	\$59	\$1.77
Oct	15	290	\$584	19	\$39	\$2.01
Nov	13	57	\$95	4	\$7	\$1.66
Dec	8	39	\$66	5	\$8	\$1.69
Overall		17,221	\$41,685			\$2.42

Table IV-1. Iridium Use Statistics for BLM Alaska in 1999

Table IV-1 shows cumulative totals, and derived rates, for billed use of the phones each month. “# Active Phones” represents only phones actually billed for air time. Because some phones were carried for safety and used very little, this table under-represents the number of phones carried in the field. Also note that we were acquiring new phones during the first 6-8 months, so the aggregate figures may not be reliable predictors of future use during that part of the year.

The most interesting figures in Table IV-1 are contained in the “Min/phone” and “\$/min” columns. The former should approximate seasonal use patterns statewide, which has been useful in anticipating costs for next field season. The latter shows the steady reduction in air time rate this year. During the first half of the year, average rates decreased as increasing use made the fixed monthly fees a less significant portion of the total bill. During the last half of the year the elimination of fixed monthly fees can be clearly seen. This is most obvious in the drop between May and June, which is when a significant number of accounts were converted to the new Alaska Plan.

Also of great interest are the totals at the bottom of Table IV-1. For a total air time of over 17,000 minutes we paid just under \$42,000, to give an average cost for all use of around \$2.42/min. Next season, that cost should be closer to \$1.70/min. From that, we see that a similar amount of use will cost about 30% less, or a like number of dollars will allow for a nearly 45% increase in use.

Budget Category	Relative air time
Resource	60%
Fire	30%
Pre-suppression	10%

Table IV-2. Approximate Distribution of Air Time

Table IV-2 roughly separates the billed time by budget category. “Resource” includes all non-fire related use. “Fire” use was charged against fire suppression funds.

Perhaps the most indicative result from the budget issue was not quantitative. The perceived benefit of this technology was driven home when Resource users began purchasing Iridium phones in quantities, from their own limited operational funds, without prior budgeting for them. Given that mission needs always exceed available funding, these users do not spend those funds lightly. They voted for this technology in the most significant way possible.



## V. Survey results

After the field season, users were asked to fill out a brief survey on their use of Iridium phones. The survey asked eight specific questions. Results from the first six questions will be detailed in this section. The seventh asked for anecdotes, which will be reproduced in section VII. Question eight asked for suggestions for improvement, which will be listed in section VIII. At the end of the survey was the invitation “Anything else?” Comments included there are scattered among the various sections of this report.

There were 62 respondents. This is an excellent return, considering that we started the season with about 50 phones, ended the season with about 65 phones, and about 10-15 were regularly shared among multiple users

For the questions in this section, multiple responses were frequent. On the other extreme, some respondents answered only one question. The questions were open ended, and the categories summarized below are groupings of similar or identical wording in user responses. The bar graph on the right margin includes a mark for each response falling into that category.

*1) Describe your general use of the phone. How did it fit into your mission? Was it carried for safety only? Did you do routine business with it? Etc.*

Routine business, daily use	
Logistic support	
Flight following	
Aircraft schedule changes	
Safety, mostly, little operational use.	
Daily call home for personnel	
Fire Incident Command communications	
Office voice mail checking	
Legal, technical questions & equipment problems in the field	

*2) Very Important: To what extent did the Iridium phone replace use of VHF/FM radio?*

To a large degree or completely	
No radio coverage exists, first time with reliable communications	
Different uses, not replacement	
15% - 25%	
Replaced HF/SSB radios previously used in field and on sea going charter vessels	

3) Give an overall assessment of the usefulness of the phone.

Extremely useful	
Very useful	
Improves efficiency for employees and aircraft	
Safety value immeasurable	
SMS very useful	

4) Make an estimate of how much you used the phone (number of calls per day/week, total minutes of use, whatever) and over what calendar time.

I have attempted to lump responses into similar bins for tallying. The bins represent use rates when phones are deployed, not averages across the season. See Section III for season aggregates.

<1 call per day	
1-5 calls per day	
6-10 calls per day	
>10 calls per day	

5) List the positives (benefits experienced or perceived, coverage area increases, etc.).

Unlimited coverage area	
Added security/safety	
Reliable	
Easy to use (not much to remember)	
Easy to carry, lightweight	
Technical information to complete job always accessible	
SMS from office very useful	
Can have extended discussion, unlike radio requiring short use cycles	
Fairly small and durable	
Invaluable in emergency	
Direct PSTN connection, doesn't require relay from dispatch	
Problem resolution much faster	
No communication without it	
Real-time private conversations	
Don't have to remember which radio repeaters to use in different areas	
Field staff can call office, but office can't call them	
Instant access	
Flight following much more timely (eliminates need for round robin)	

Eliminated uncertainty in field communications, particular marine	
Eliminated daily flyover for fires outside radio coverage	
Eliminated need for night dispatcher on duty, by posting duty officer home phone #	
Easy contact with office for dealing with tasks there	
Family's sense of security knowing I can be in contact	
Easy to teach the use of phone	
Could not check voice mail with radio phone patch, but could with Iridium	
Tremendous freedom and time saving in not having to find a phone in villages	

6) *List the negatives (operational problems, limits of equipment, etc.).*

It should be noted that the first two or three items appear to be addressed by the upgrades available to the Motorola 9500 phones, which had not been done yet on a majority of the Alaska units.

Connections often lost after 2-5 minutes	
System busy status required redial	
Garbled speech at times	
Battery life too short	
Antenna comes loose too easily, antenna design, antenna issues	
Needs open area, can't use inside buildings/trailers/etc	
Phone is "big & clunky"	
Marginal operation under forest canopy	
Single user – no "party line" access for others in crew	
Phone is delicate, not protected from dust and water	
Receiving calls is impractical	
Cost of phones and calls	
Responsibility for "one more piece of visible equipment" in field	
Too many options on phone	
Not hearing aid compatible	
Not enough phones available	
PSTN switches need to be programmed to recognize Iridium country code	
Slight delay causes awkward communication at times	
Cumbersome phone number	
Attractive nuisance – onlookers wanting to try it out	
Phone access from field crews sometimes complicates dispatching	
Phone turns on in pack, sometimes	
Susceptible to cold	
Liability	

## VI. Operational Discussion

This section will discuss some of the problems and issues raised above, as well as pass on some operational information that doesn't fit in sections above.

### **Dropped Calls**

Lost connections on calls in progress was commented on repeatedly. Given the intense and wide ranging operational use of the phones, we were not able to collect detailed use statistics from which we could arrive at a quantitative measure of this dropping of calls. My sense is that it was less than 50% and more than 10%. INA reports that their call detail records show dropped call rates from 8% to > 18%. They suggest it was largely due to the algorithm for handing off calls from satellite to satellite as they passed the phone's view, and that a significant improvement has been made in the satellites. Motorola 9500 phones need the firmware upgrade to take advantage of that improvement.

There seemed to be no correlation between dropped calls and time of day, location, phase of the moon, etc. Of course, in terrain with blocking elevations, we expect some transient signal degradation or blockage as satellites move. For example, a year ago a phone was taken into the Brooks range on snow machine. The location was a fairly narrow, east/west valley with 1000' - 2000' hills around three sides, opening to the east. Calls were readily made from this location, but only maintained 3-5 minutes, then reliably dropped. By the time they could push redial, a new connection could be made and maintained for another 3-5 minutes. In this case, I'm guessing that the sky view angle was less than the satellite spacing north to south, given the consistency of the drop-out/redial pattern.

### **Phone Reprogramming (Upgrade)**

Earlier phones have been upgraded by reprogramming on site, but many of our oldest phones would not take the reprogramming and are being returned to Motorola. Phones procured since about July have come with an indicator that they have the upgrade. However, the programmer we used has a version date of 1Oct99, and there are differences from the earlier upgrade. A reliable indicator of this later version can be found with the following procedure. Power the phone on, wait until it displays "Searching", then press the sequence: "\*#91#". The display should indicate "INC0607" for the Oct 99 version. Earlier versions will not display anything in response to this command. All phones not responding with the code should be upgraded for the greatest operational benefit. We have only scattered use over the winter, and won't know how significant the improvement is until volume use resumes in the spring. Casual use following reprogramming suggests a noticeable improvement in ability to register, rapidity of call set up, clarity of voice and reduction in drop out.

## **System Busy**

The phones seem to report any inability to communicate as "system busy". So when folks were delayed in placing a call, what they were seeing was most likely the same problem as the dropped calls -- brief periods of weak signals because of relative satellite positions. In all cases, folks reported that they waited a minute or two and tried again. Once in a while it took 2-3 retries, then they connected. Users commenting on this usually finished with "But I always knew I could get a call through when needed."

## **Emergency Response and System Overload**

In an emergency response situation, we'd expect to use hand held radios for most scene of action communications. The Iridium phones would be used to connect outside the emergency area. We have considerable experience using cell phones this way, and we know we can seriously overload a single cell site. However, the Iridium system is enough different that it should function much better than cell phones with respect to loading. The footprint from each satellite is approximately 2700 miles in diameter and is composed of 48 spot beams. Thus, each spot beam covers an area approximately 300- 400 miles in diameter. Iridium says that each spot beam can handle about 400 simultaneous call initiations, and an even larger number of ongoing conversations. So there should be no practical limit to the numbers of ISUs that can register and place calls within a local geographic area. The practical limit is in the gateway, in how many vocoders they have available for linking into the PSTN. That number is determined by standard telephony engineering guidelines at the P01 level (1% of calls blocked during normal busy times). For ISU to ISU calls, there should be no practical limit, and the design blocking level there is P005. The bottom line is that we can never be assured that we won't overload any communication system available under the right (wrong?) circumstances of use. Just try to place a long distance call in the US on Mother's day!

## **Other Services**

Users have suggested or requested various extra services.

For emergency responders, having priority to the system may be important. This is something that has been discussed within the Iridium circles, but for the time being they are focused on getting a solid telephone system up and financially secure.

There is a military gateway in Hawaii, which is available for government agency use, after military review of an application. There may be operational features available there that the commercial gateway in Phoenix doesn't offer. At one time, Iridium was working on a "Net

Voice” (push to talk, multipoint) feature which would be available through the Hawaii gateway. Development on the latter has been indefinitely suspended, as of the last word I received.

The data channel is still under development. When it first becomes available, it will be a modem equivalent, for making point-to-point dial-up connections, and very slow (2400 baud). For many applications, it would be beneficial to have a packet data system, which could send small data packets in between voice packets, transparently. I will continue to promote this.

## **New Phone Features**

The new Motorola 9505 phone, just released, has: connections for an encryption unit, so they can be used for secure communications; connections for cell-phone compatible earphone and microphone for hands free operation; data port for SMS to/from a notebook computer; less susceptibility to dust and moisture. I will be procuring these for evaluation.

## **Accessories**

A variety of accessories are available for both Motorola and Kyocera phones. The Kyocera accessories are slowly becoming available. Kyocera offers a full mobile mount, including separate handset, speakerphone and power from the vehicle. Motorola offers a docking station for fixed site use, which offers separate handset, speakerphone, 2<sup>nd</sup> SIM slot, charging drawer for 2 batteries, and external power connections for AC or DC (e.g. solar panel). Both offer external antennas for fixed mount. Motorola offers two different magnetic mount mobile antennas. There are many other accessories. We have samples of many of the accessories, and varying amounts of experience with them.

## **Cost/Benefit Examples**

Fire operational procedures require positive contact with all fire crews at least once a day. In areas of no backbone radio coverage this has meant a daily overflight. Between the plane (\$225/hr) and the personnel (\$25/hr), daily flights to a fire can cost hundreds of dollars. An Iridium phone call to meet this requirement would cost under \$10. A three day fire an hour away would require \$1,500 for overflights vs. \$30 for Iridium phone calls, thus paying for a phone in a single small incident.

As illustrated by anecdotes, launching a full Rescue Coordination Center search and rescue mission was avoided by a \$10 Iridium phone call, probably several times this year alone. This is compared to the cost of launching a Hercules with a full search crew to fly from Anchorage to the farthest north parts of Alaska and perform a search.

## VII. Anecdotes

### *7) Describe any specific anecdotes that illustrate the usefulness to you.*

This section is voluminous, but I believe it presents the operational picture far better than any other way. The anecdotes have been copied verbatim from the responses, with minor editorial changes to eliminate names, or, in one instance, to merge two accounts of the same story.

#### Geologist

I was doing GPS mapping and compliance inspection of a mineral material sale site on the north shore of Selawik Lake some 90 miles east of Kotzebue. From there I was scheduled to fly to Kiana and pick up a miner to take him with me for an inspection of the cleanup and reclamation work he had accomplished on his mining claims which were another 40 miles north of Kiana. Access to the gravel site and the mine site was by helicopter. Since I didn't know how long my gravel pit inspection would take I told the miner I would call him when I was sure of my arrival time in Kiana to pick him up. That way he wouldn't have to wait for me at the airstrip. I called him when I finished, flew to Kiana, picked him up and flew to the mine site - no waiting on either of our parts.

My second use of the satellite phone was a call from a mine site south of Candle, Alaska to the chartered air carrier office in Kotzebue to order a drum of jet A-50 fuel to be delivered in Candle by fixed wing so the helicopter I was using would have enough fuel to get back to Kotzebue at the end of the day. I had pre-arranged the call for fuel on an as needed basis, since I did not know how much flying we would do until I arrived in the Candle area.

#### Outdoor Recreation Planner & Wildlife Biologist

During a reconstruction of the Rohn cabin on the Iditarod Trail in the Alaska Range, we discovered the roof was severely rotted. We called for additional materials (enough for new roof), which were sent without delays in the work schedule. If not for the phone, the cabin might have remained without a roof until next summer, possibly severely damaging the structural values of the cabin. At the very least, we would have had a round trip to Anchorage by someone from the work crew, at an additional cost of \$1000. The roof material arrived and all was saved. We communicated to the office that we needed to extend our stay several days due to weather and additional work needed. A rescue effort may have ensued had we not had comm to the real world.

#### Fire Suppression Specialist

I had the opportunity to use the Iridium for two weeks while down at Chicken working the B245 fire - it worked out nice because we had no FM link to FBK at first, Radio Shop came down and eventually set-up a repeater, but until we got the FM link it was nice to have instant access

back to town. There were two of the Iridiums there at Chicken and they were the most-used piece of equipment in fire camp.

#### Wildlife Biologist

The phone was tremendously useful, allowing for much safer flying than ever before because of the ability to call in frequently from such a remote area. This was especially useful when our helicopter broke down 70 miles northwest of Umiat. We were able to call for assistance immediately. Without the phone we would have been using a round-robin flight plan and would not have been missed for about 8 hours. Even then, our location would have been known only within a 50 mile radius circle. These time delay and location problems could have been improved by activating an ELT or PLB, but then rescue would have been very expensive, and not in a form appropriate for the circumstances.

#### Outdoor Recreation Planner

While on Gulkana River, encountered unauthorized guide and party. Was able to call after hours, on weekend and verify the guide was not authorized and let law enforcement handle the problem. With radio system, have few places on Gulkana River where it is possible to transmit out and probably would not have reported incident until we got off the river.

Campground hosts at Sourdough and Tangle Lakes Campgrounds also were issued the phones because we have problems with radio communications in these campgrounds and no public or private phones are readily available to report emergencies and deal with problems after office hours.

#### Health & Safety Specialist

I drove a maintenance vehicle up to Coldfoot on May 9th. It was loaded with all sorts of carpentry supplies and tools and was pretty heavy. The thought that this vehicle would not make it to Coldfoot (250 miles) on one tank of gas never entered my mind. Well, needless to say, I ran out of gas 20 miles from Coldfoot. I needed to get hold of Coldfoot Services so they could bring me out some gas but I didn't know the number. I called information with the Iridium phone but it wasn't available. Remember, this was Sunday and Mother's Day on top of it. I called my sister because I knew she was home and had her look up the number for Coldfoot Services. She gave me the number and I called them. They brought me 5 gallons of gas and I made it to Coldfoot. It should be mentioned that Coldfoot Services did not charge me for the service, only the price of the gasoline.

#### Wildlife Biologist

While working the Bonasila River, I found myself 100 miles up river from the village with a very marginal supply of gas to get back. I called the office in Anchorage, let them know of my situation, and was able to have a helicopter that was contracted to BLM in Unalakleet bring 10



gallons of gas and meet us on the river. It may have been a long float back if we did not have the phone.

#### Ducks unlimited cooperator

I helped coordinate 6 field crews (20+ people) around interior and coastal Alaska this summer - each crew had 1 or 2 satellite phones. The crew I participated on had a luggable satellite phone (45 lb. briefcase-size variety) in addition to an Iridium phone. Our first staging location was on the northwest side of the Alaska Range. The luggable phone (which we planned on having on all the time) could not pick up or hold satellites and radio-communications were limited to line-of-sight. We ran critically low on fuel and food and had to call in for supplies. With the Iridium phone we were able to do so. We also had to reschedule charter flights due to weather which the Iridium phone allowed us to do. The other crews were checking in with me if they needed anything and again the Iridium phone (not the old trust-worthy luggable) got the job done. We overcame our problems with the Iridium by getting all important information out within the first 2-3 minutes of the call (satellite strength tended to drop off rapidly and connections were easily lost) and by using an external, multi-directional antenna so the phone could be used indoors rather than in screaming winds and rain (not all crews had the luxury of this attachment and were therefore hard to get in touch with).

The day a few of us got dropped off on a remote wilderness lake and relied on a helicopter to find us in the fog we were grateful to have the Iridium phone and the extended 8-hour battery (we were in touch with someone at home base who could reach the helicopter by radio and guide him to us).

#### Geologist

I was at a remote mine site this summer. Our work crew finished our work early. Rather than sit around for a day, we called the charter company in Fairbanks and arranged an earlier pickup. It took about two minutes.

I carried a phone once when I had to ride an ATV into another remote area near Chicken. Since I was by myself and in unfamiliar country, I was nervous about getting stuck or having a mechanical break-down many miles from the road. I liked having the phone with me because I could have called for help from wherever I had a problem.

#### Ranger

I contacted an individual regarding a violation in the Nome Creek area. Before issuing him a violation notice, I was able to use the Iridium phone and telephone Alaska State Troopers to run a records check on him. In the past, I would not have had the capability to contact AST from that location.

#### Fire Suppression Specialist

I used the Iridium to some extent for a 15 day fire out of Rampart. I worked at a staging area at the Rampart Airstrip. Instead of using the radio for complicated business, I phoned our dispatch 4-8 times a day (2-10 minutes per call). Very handy in that respect.

#### Natural Resource Specialist

It was very useful when an aircraft radio didn't work. It allowed us to flight follow every time we landed, permitting us to finish the mission and saving dollars from possible search flights that may have been dispatched.

#### Fire Management Officer

Landed at a site near Chicken in helicopter. Had been working low level. Would have had to go up to 3000 to 4000 feet to hit mountain top repeater. Simply landed at site, turned on phone and checked in.

#### Ranger

The most important call made was 200 miles north of Fairbanks when my transmission went out on my patrol truck. I was able to call for a wrecker to respond to tow the vehicle back. I was in an area of poor radio reception.

You can put down another rescue for the space phone on Sun. the 9<sup>th</sup> of Jan. While on the Dalton, 20 miles south of the Yukon River, the transmission went out of my patrol vehicle again. With the aid of the Iridium phone I called for a wrecker to tow the vehicle back to the dealer for repairs. The temperature was about -28F.

#### Outdoor Recreation Planner

I was COR on a well drilling contract at Walker Fork Campground about 100 miles from Tok. There were a couple of technical questions that needed immediate resolution. It would have been difficult to describe and relay the message over radio due to the technical content. Over the radio via a person with no knowledge of what I would have been talking about, the message would most likely have been mis-communicated, either when transmitted or when the answer came back., as they have so many times before. With the Iridium, I was able to call directly to the Contract Officer in AFS and the Engineering Dept at AFS for quick, clear resolution.

#### Realty Specialist

I initially planned to do this by boat, since it was supposed to be at Sesolik, just across the water from Kotzebue. I changed to a helicopter when the applicant said he was 70 years old and didn't want to go that far by boat unless the water was smooth. I didn't want to take a chance on the water being smooth, and scheduled a helicopter. Besides, a boat would have cost \$300 (a windfall for the boatman), and a helicopter for such a short a trip probably would not cost much more.

We scheduled the exam for 0800, and had to postpone until 1100 due to coastal fog. It was still foggy for about one or two hundred yards inland from the coast.

Before we took off I talked with (applicant) and showed him the maps and where I thought we were going. He was familiar with the area and named the applicants on either side of where his Parcel D was supposed to be. (Another man) Kotzebue IRA, also knew the area and went along on the exam. This looked like an easy exam; we just needed to find one of the existing survey monuments for a tie-in, and finding the monuments should be easy because it would just be short seaside vegetation.

We got across the water and into the area. There were survey monuments all over the place, and we landed a few times to identify the survey markers. Since this is right on the coast it was hide and seek with the fog, and visibility was only a few hundred yards and sometimes less. (applicant) was naming the camps as we went. We identified the area Parcel D was supposed to be; at this point (applicant) pointed up the coast and said his Parcel D was 15 miles away at Cape Krusenstern.

This, of course, caused some consternation. We thought he was probably trying to take us to one of his other parcels. We flew up the coast towards Cape Krusenstern, meanwhile trying to explain to him we wanted to see Parcel D, not one of his other parcels. Since communicating over the intercom and seat back was not working very well, we landed and pulled out the maps. (Applicant) said he had never been to Parcel D as applied for; one of his sons must have said he had an allotment there. He also described his other three parcels as being on the Little Noatak River and that area. We were then convinced he really was taking us to his intended Parcel D, and piled back into the helicopter and took off for Cape Krusenstern through the fog. (Applicant) continued to name camps as we went up the coast.

We landed on Parcel D. At this point we were off the maps I had with me, and we were concerned about possible conflicts with other allotments. I got a GPS location with my handheld GPS, and called the Fairbanks Public Room on my Iridium phone. After some coaching on using ALIS to convert lat/long into township and range, and pulling an MTP in the wrong meridian, we determined there was only one allotment in Section 31, with room on either side for another allotment. The applicant in Section 31 was (another). I asked (applicant) where (another's) allotment was, and he pointed on the up coast side of the triangle I had installed. This was consistent with his earlier indication that his allotment was on the down coast side of the marker.

We made our way back to Kotzebue a quarter mile inland in bright sunshine. This easy one hour exam just across the water had turned into a three hour exam to Cape Krusenstern.

## VIII. Suggestions for Improvement

*8) Do you have any suggestions for improvement in the phones, the service, or other aspects of the system?*

The following suggestions were mentioned explicitly. However, weighting should not be taken too literally, as many responses to question 6 imply desired improvements.

Better protection from environment we work in, waterproof it, make it float	
Smaller phone	
AA Battery pack	
Increased battery life	
Aircraft attachment for use in flight	
Needs external antenna	
Internet access	
Simpler phone at lower cost – only need way to place call to PSTN	
Improve signal quality and link holding	
Small solar panel included	
Improve antenna attachment	
Make volume buttons less easily pressed during normal use	
ATV/Snowmachine adapter kits for power/charging.	
Hearing aid compatibility	
Fix call drop out problem	
Ability to send larger data files	
Incorporate GPS into it that broadcasts its position periodically, or when turned on.	
Positive acknowledgment that phone received SMS	

## IX. Miscellaneous Operational Comments from Users

### Fire Management Officer

I tried the phone from the Aero Commander. Used it twice. Acquisition was no problem. Calls went right through. I could hear the person I called but apparently the microphone on phone is very sensitive so picked up all the noise and person I was talking to could not read me very well. Might work in a pinch if I had no other way to make contact from aircraft.

Excellent tool! Best technological advancement since the Shindaiwa pump. This item is a “must have” in our business, no doubt in my small mind.

### Ranger

I used and tested the Kyocera phone and found it to be very user friendly. I made all of my calls north of the Arctic Circle and found that getting registered was very fast. I never was able to get to a location that I could not call out of (as long as I was outside my vehicle). I received several e-mail messages and even without a user manual this phone is a pick up and use model.

I found that due to the size of the Kyocera I carried it on my person almost everywhere I went and I did not have to remove it from its carrying case, another bonus. I also found that the antenna did not release in the carrying case like the Motorola unit did and the antenna is easier to manage.

I believe the battery lasts longer than the Motorola. This past week in Coldfoot the Motorola phone carried by another went down and this unit is still operative. However, I found that when the battery is low there is no warning, only a beep, beep and the signal is lost.

### Radio Technician

I kept my phone in a water proof bag to keep it from getting wet and possibly rendering it inoperable. Supplying these for folks in the field might save on water damage.

### Outdoor Recreational Planner

Curiously, deep canyons and valleys did not affect the quality, but the trees sure would.

### Environmental Protection Specialist

These should be standard field equipment, especially when they get more compact and cheaper.

### Wildlife Biologist

I hope BLM uses the Iridium phones as a standard way to communicate from remote places in the field. I think it adds a much higher level of safety for field crews.

#### Zone Coordination Officer

In some instances (BTT area fires in particular) there was radio coverage yet the ICs found the phones more convenient. I suspect this was so they didn't have to climb up to a high point or string up a Larsen antenna.

#### Outdoor Recreation Planner

After doing business with the Iridium phone, I would not like to adjust to field work without it. It's a great way to do business while out in the field and to put family at ease so that the work can be done effectively.

#### Mining Engineer

I used the phone to respond to two family emergencies that occurred. Without the phone I would not have been able to resolve these situations. The peace of mind this gave was of enormous value.

#### FWS Wildlife Biologist

Previously I was extremely frustrated by the idiosyncrasies of the radio phone patch system, and daily check-ins to the Fairbanks office were often more aggravating than not. The Iridium phone made check-ins very easy, less stressful, and less time consuming. I also felt like I would have a better chance of getting through to the office with the iridium phone than if I had to depend on the radio phone patch system.

#### Outdoor Recreation Planner

It would be nice to be able to issue these to all our field going personnel, including seasonals, volunteers, campground hosts, etc.

#### Ranger

But those inevitable problems aside, the phone provided communication in places where we never had any before. I wouldn't go out there without one anymore.

#### Smoke Jumper Chief

The units seem to be meeting the needs of the smoke jumpers. The Galena zone likes the positive contact with remote fires.

#### Surveyor

It may sound simple, but just getting a plane out of a remote bay where we were working to a town was, pre-Iridium, a pretty daunting task. Most areas had no radio coverage, so the Iridium really came in handy.

#### Smoke Jumper

My IC was able to discuss strategy of a fire going bad directly with zone FMO.

#### Archaeologist

Occasionally we had crews working outside our radio coverage area (north of Brooks Range). Since someone was not always near the phone at the base camp we set up a procedure whereby if a field crew did not get an answer at the base camp, they would call NFO and leave a message on my voice-mail. The person at the base camp would check my voice-mail every hour for messages from the field crews.

#### Fire Management Officer

The Iridium pager worked exceptionally well. All messages sent (note log sheet) were received within 2 minutes of being sent. Messages were received in Fairbanks, Delta, Glennallen, and most impressively in the Copper River Canyon south of Chitina. If you haven't been there before, the Copper River Canyon is a steep narrow rocky canyon with limited horizon.....In general an excellent performance.